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PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

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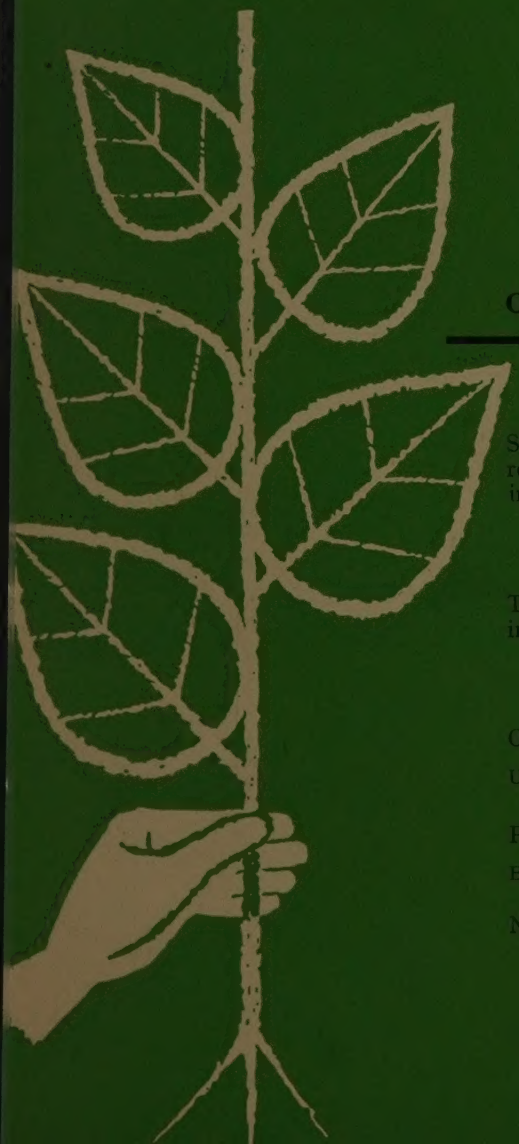

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FAO PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

Studies with Chemical Seed Treatments as Bird Repellents for the Protection of Germinating Maize in the Mexican Tropics[1]

William R. Young and Daniel Candia Zevallos,[2]
The Mexican Agricultural Program of the Rockefeller Foundation, Mexico, D. F.

During the winter months, large flocks of migrating blackbirds congregate in the tropical zone of Mexico along the Gulf Coast. These birds, chiefly the brown-headed cowbird, *Molothrus ater ater* (Boddaert), and the boat-tailed grackle, *Cassidix mexicanus mexicanus* (Gmelin)[3] (Figure 1), often cause serious damage to germinating maize planted during January, February or March. The seedling plants are pulled and the seeds consumed by the birds. At the research center of the Mexican Ministry of Agriculture near the City of Veracruz, it has been necessary to employ bird chasers to protect the stands of maize in winter experimental plantings.

This paper reports the results of studies conducted during 1957 through 1959 at the Veracruz Center in a search for an effective chemical seed treatment to repel birds and thus protect the experimental plantings. These results may be helpful to other workers with a similar problem.

A recent review of the literature on bird repellents has been made by Neff and Meanley (1). The results of the studies reviewed by these authors indicate that the effectiveness of a repellent is not only influenced by the species involved but may also vary greatly with a single species, depending upon local food and habitat conditions. It has therefore been difficult to draw general conclusions from results obtained with repellents in only one or two geographical locations.

Among the materials found to be effective repellents in the studies reviewed by these authors were coal tars, red lead, starch, zinc phosphide, Brillant Green dye, anthraquinone, naphthalene, dinitronaphthalene and lindane.

Neff and Meanley (2) tested 54 different chemical compounds on rice against blackbirds, cowbirds and grackles in caged feeding trials in both an outside aviary and maturing rice fields. In these tests, thiram (tetramethyl thiuram disulfide) and anthraquinone formulations exhibited repellent action against all three species. Neff, Meanley and Brunton (3) further demonstrated the repellent action of these same chemicals in several different formulations. In these tests cowbirds and red-winged blackbirds detected concentrations of thiram or anthraquinone as low as 1 percent by weight on grain where concentrations were varied from 1 to 10 percent.

Kramer (4) effectively repelled birds on maturing experimental sorghum plots near Lubbock, Texas, with an application of a 1 : 7 water dilution of a 42 percent commercial thiram suspension.

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[1] *Paper No. 122* of the Agricultural Journal Series of the Rockefeller Foundation.

[2] Rockefeller Foundation Scholar from Bolivia to the Mexican Agricultural Program.

[3] Identification of the birds kindly made by Professor Rafael Martin del Campo, Institute of Biology, National University of Mexico, Mexico, D.F.

Figure 1. The two species of birds that cause serious damage to germinating maize in the Veracruz area, Mexico. Above, the brown-headed cowbird (*Molothrus ater ater*) and below, the boat-tailed grackle (*Cassidix mexicanus mexicanus*). Photographs taken by Mr. Neil B. MacLellan at the Museum of Natural History, Mexico, D. F., through the courtesy of the director, Sr. Liborio Martínez López.

Figure 2. Maize seed, treated with prospective bird repellents, after exposure to feeding on the soil surface. Note complete removal of grain from the untreated check in the foreground. Cotaxtla Research Center, Veracruz, 1959.

The promising results obtained by others with thiram indicated that this material, a readily available fungicide in Mexico, might well be effective at the Veracruz Center. It was therefore thoroughly tested in 1958 and again in 1959 along with three other chemicals.

1957 test

During March 1957, befor ethe thiram tests were begun, one preliminary experiment[4] was conducted in the field, in which maize seed treated with Z.I.P.[5] (160 cc. of 1 : 3 water dilution per kilogram of seed) and endrin 1.2 percent by weight (50 percent wettable powder with methocel sticker) was compared with an untreated check. Z.I.P. is an effective repellent for rabbits and deer and it seemed possible that this formulation, as well as endrin, might effectively repel birds.

Treated seeds were planted in the field in replicated plots and counts were made of healthy plants remaining after 12 days of bird feeding. In the Z.I.P., endrin and untreated plots, respectively, 70, 72, and 62 percent of the plants remained. As these differences were not significant, the results indicated essentially no repellent action for the two materials at these rates of application. Germination was not affected by either Z.I.P. or endrin.

1958 test

During March of 1958 varying concentrations of thiram[6] were tested on maize seed under the following conditions.

1. Treated seed was exposed on the ground surface (Figure 2) under trees where the birds frequently roosted, and the amount consumed after five days was recorded.

[4] The assistance of Alejandro Ortega C. in this experiment is gratefully acknowledged.

[5] Z.I.P., zinc dithiocarbamate-amine complex 30 percent plus polyethylene polysulfide 10 percent, a product of Larvacide Products, Inc., Ringwood, Illinois.

[6] Arasan-75, seed disinfectant and protectant containing 75 percent tetramethyl thiuram disulfide, a product of E.I. DuPont de Nemours & Co., Inc., Wilmington, Delaware.

2. Treated maize, planted in flats of soil, was exposed to the birds under the same trees from the time the plants emerged until they reached a height of 8 to 10 centimeters, when the number of healthy plants remaining was recorded.

3. Treated seed was planted in the field and the plant stand remaining three weeks after planting was recorded.

The treatments used, freshly prepared for each test, were as follows: thiram 0.1 percent technical by weight with sticker,[7] thiram 0.2 percent with sticker, sticker alone, thiram dust 1.5 percent, and thiram dust 3.8 percent. Each test included an untreated check. The seed, a local adapted hybrid maize (H-503), was treated in a glass jar, and where sticker was used it was added at the rate of 6 cc. of a 1 percent solution per 100 grams of seed. Treatments were replicated six times in all tests, and 100 grains were used per plot on the soil surface and in flats, while 72 grains were planted per plot in the field. Data were evaluated with the analysis of variance.

The results of the 1958 tests are summarized in Table 1. The thiram treatments and the Spreader Sticker exhibited repellent action to the birds under all three conditions, with the effect most notable when treated seed was exposed on the soil surface. Under this condition all treatments gave a highly significant reduction in bird feeding as compared with the untreated check.

When the maize was planted in the soil in flats, all treatments except thiram dust 1.5 percent reduced bird damage in comparison with the check. However, practical control of bird damage was not obtained; approximately 50 percent of the plants were destroyed in the more efficient treatments. The results obtained with treated seed planted directly in the field were similar to those in the flats. Here plant stand was also reduced by a light infestation of cutworms. In these tests there was no indication of phytotoxic action on germination in any of the treatments.

TABLE 1. The bird repellent action of various maize seed treatments with thiram against cowbirds and grackles, Cotaxtla Research Center, Veracruz, March 1958

Treatment	Exposure of treated grain		
	on soil surface; percent of grain not consumed after five days	planted in soil flats; percent of healthy plants remaining after four days	planted in the field, percent of healthy plants remaining from 72 seeds after three weeks
Thiram 1.5% dust	73.8	35.5	[a]
Thiram 3.8% dust	68.8	54.1	48.5
Thiram 0.1% with sticker	72.1	50.1	24.0
Thiram 0.2% with sticker	65.8	51.8	44.4
Sticker 1%, 6 cc./100 gm. seed	63.3	54.6	47.5
Check	4.1	29.5	3.6
L.S.D. .05	23.6	13.0	22.8
.01	32.1	17.6	32.0

[a] Not included because of poor control obtained in soil flats.

Although practical bird control was not obtained, these results showed promise and thiram was therefore retested at a higher conentration the following year.

1959 test

In the spring of 1959, two further series of tests were conducted, including higher concentrations of thiram and three additional materials. The procedures used and test conditions were the same as in the previous year, except that exposure periods were shortened and the number of replications was reduced to four.

In the first series the treatments were: thiram 3.8 percent and 7.5 percent with sticker; thiram 3.8 percent and 7.5 percent as dust; sticker 1 percent (6 cc. per 100 grams of seed); B-13X[8] at the rates of 2 and 5 cc. per 100 grams of seed; B-5-20X[8] at the rates of 2 and 5 cc. per 100 grams of seed; and an un-

[7] DuPont Spreader Sticker, a mixture of sodium sulfates of mixed long chain alcohol - fatty acid esters and diethylene glycol abietate, a product of E.I. DuPont de Nemours & Co., Inc.

[8] B-13X and B-5-20X, two experimental repellents supplied by S. B. Penick & Co., 50 Church Street, New York 7, New York.

treated check. The concentration of thiram in the 7.5 percent dust treatments was lower than the indicated percentage, since this amount of dust would not adhere to the seed.

The results of this series of tests are presented in Table 2. Again the thiram treatments and the Spreader Sticker exhibited the most efficient repellent action. Furthermore, these higher concentrations of thiram gave practical protection from the birds in the field, as did the Spreader Sticker, which was used at the same concentration as in 1958.

TABLE 2. The bird repellent action of various maize seed treatments against cowbirds and grackles, Cotaxtla Research Center, Veracruz, February-March 1959

Treatment	Exposure of treated grain		
	on soil surface; percent of grain not consumed after three days	planted in soil flats; percent of healthy plants remaining after three days	planted in the field; percent of healthy plants remaining from 72 seeds after two weeks
Thiram 3.8% with sticker	89.5	[a] 95.6	90.5
Thiram 3.8% dust	92.5	95.5	89.5
Thiram 7.5% with sticker	87.5	98.0	97.5
Thiram 7.5% dust	78.8	95.0	92.2
Sticker 1%, 6 cc./100 gm. seed	91.5	93.0	90.5
B-13X, 2cc./100 gm. seed	50.1	43.0	74.8
B-13X, 5 cc./100 gm. seed	49.2	25.5	65.2
B-5-20X, 2 cc./100 gm. seed	51.8	33.5	79.8
B-5-20X, 5 cc./100 gm. seed	49.0	26.5	72.2
Check	20.7	23.0	53.5
L.S.D. .05	34.9	21.8	13.7
.01	47.1	29.37	18.5

[a] Based on seeds that germinated.

B-13X and B-5-20X exhibited slight repellent action on grain on the soil surface. These two materials markedly affected germination of the maize in the soil flats, as indicated in Table 3, and gave little repellent action to protect the plants that germinated. Under field conditions germination was not so seriously affected, but repellent action with these materials was not as efficient as with the thiram and Spreader Sticker treatments.

TABLE 3. The effect of various chemicals applied to maize seed as bird repellents on germination in soil flats, Cotaxtla Research Center, Veracruz, March 1959

Treatment	Percent seed germination
Thiram 3.8% with sticker	97.8
Thiram 3.8% dust	96.8
Thiram 7.5% with sticker	93.5
Thiram 7.5% dust	90.0
Sticker 1%, 6 cc./100 gm. seed	96.5
B-13X, 2 cc./100 gm. seed	60.8
B-5-20X, 2 cc./100 gm. seed	60.0
B-13X, 5 cc./100 gm. seed	17.5
B-5-20X, 5 cc./100 gm. seed	18.2
Check	89.2
L.S.D. .05	22.8
.01	30.8

After this first series of tests was terminated, an additional prospective repellent, Drinox,[9] was obtained. This material, containing 30 percent aldrin and formulated as a seed treatment for the control of soil insects, has exhibited repellent action to birds on rice in southern United States. A second series of two tests was conducted to compare Drinox with the thiram formulations. The same procedure was followed, except that two concentrations of Drinox, 0.5 cc. and 1.0 cc. per 100 grams of seed, were substituted for the B-5-20X treatments and the soil flat test was omitted. The results are presented in Table 4. Drinox gave protection equal to that of thiram and Spreader Sticker to the treated grain on the soil surface, and in general gave better protection than these materials in the field. The results with B-13X were variable; better repellent action on the soil surface than in the previous test but very poor action in the field.

[9] Drinox, a 30 percent liquid aldrin preparation supplied by Panogen Company, Ringwood, Illinois.

TABLE 4. The bird repellent action of various maize seed treatments against cowbirds and grackles, Cotaxtla Research Center, Veracruz, March-April 1959

Treatment	Exposure of treated grain	
	on soil surface; percent of grain not consumed after four days	planted in the field; percent of healthy plants remaining from 72 seeds after 11 days
Drinox, 0.5 cc./100 gm. seed	91.7	85.8
Drinox, 1.0 cc./100 gm. seed	95.0	90.8
Thiram 3.8% with sticker	93.2	73.0
Thiram 3.8% dust	95.0	61.5
Thiram 7.5% with sticker	92.0	84.8
Thiram 7.5% dust	94.0	74.2
Sticker 1%, 6 cc./100 gm. seed	91.2	67.5
B-13X, 2 cc./100 gm. seed	89.2	11.8
B-13X, 5 cc./100 gm. seed	68.2	15.8
Check	34.5	41.5
L.S.D. .05	20.7	25.4
.01	28.0	34.4

Conclusions

The results of this study indicate that thiram dust 3-5 percent, thiram liquid treatment 3-5 percent with sticker, Spreader Sticker 1 percent (6 cc. per 100 grams of seed) and Drinox at 0.5-1.0 cc. per 100 grams of seed are helpful as seed treatments to repel birds from germinating maize in the Veracruz area.

The repellent action of DuPont Spreader Sticker is of special interest, since Neff, Meanley and Brunton (3) found this material to have no repellent action to the birds in their tests.

The thiram dust treatment is most convenient for small experimental lots of seed, because it can easily be dusted into seed envelopes before planting. Liquid treatments with Spreader Sticker, Drinox or the Spreader Sticker-thiram mixture may be of use in larger commercial type plantings, where greater quantities of seed are to be treated. Spreader Sticker and Drinox are less costly than thiram and are therefore better suited for use in commercial plantings.

The B-13X and B-5-20X should not be used for maize seed treatment because of their phytotoxicity.

LITERATURE CITED

1. NEFF, J. A., and B. MEANLEY. 1956. Research on bird repellents, *Progress Report No. 1 - A review of studies on bird repellents.* Wildlife Research Laboratory, Denver, Colorado (mimeographed).

2. NEFF, J. A., and B. MEANLEY. 1957. Research on bird repellents, *Progress Report No. 2 - Bird repellent studies in the eastern Arkansas rice fields.* Wildlife Research Laboratory, Denver, Colorado (mimeographed).

3. NEFF, J. A., B. MEANLEY, and R. D. BRUNTON. 1957. Research on bird repellents, *Progress Report No. 3 - Part. 1. Basic screening tests with caged birds and other related studies with candidate repellent formulations, 1955-1957.* Wildlife Research Laboratory, Denver, Colorado (mimeographed).

4. KRAMER, N. W. 1957. (Texas Agricultural Experiment Station, R.F.D. No. 1, Lubbock, Texas.) Personal correspondence.

Tristeza Disease in Native Commercial Citrus Trees in the Mediterranean[1]

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and *I. Yoffe,* Agricultural School, Mikve, Israel

A mission organized by the European and Mediterranean Plant Protection Organization in 1957 for the survey of citrus virus diseases in the Mediterranean, did not, in its random examination, find any confirmed incidence of tristeza, although a few suspected cases were recorded (6, 7). Until then tristeza in Israel (8, 9, 12), Italy (10) and Algeria (3) were found only on citrus trees introduced from foreign countries.

Recent investigation in Israel of a number of trees of the Native Shamouti sweet orange, grafted either on sour orange or sweet lime, showed that they were infected with tristeza. This finding constitutes the first record of the appearance of tristeza on local sweet orange in the Mediterranean region. As evidenced by the recent discovery of four tristeza-affected trees in Egypt (5), the writers believe that the disease exists in commercial citrus trees in other Mediterranean countries as well.

The diseased trees displayed stunting and general decline with partial defoliation and dieback (Figure 1A). Characteristic symptoms included the overgrowth of the scion at the bud union (Figure 2) and the occurrence

[1] Publication of the Agricultural Research Station, Beit Dagan, 1959 Series No. 304-E.

Figure 1. Tristeza infection in Shamouti sweet orange trees. A. A 20-year-old tree on sour orange stock, showing stunting and general decline. B. Inverse pitting at the inner surface of the bark of the sour orange rootstock.

of inverse pitting or pinholes on the inner surface of the bark (Figure 1B) and corresponding tiny acute protuberances on the wood of the sour orange stock. The bark below the union was abnormally thick, almost twice that of normal bark.

Figure 2. Bud union in a tristeza-infected Shamouti sweet orange tree, showing overgrowth of the scion.

The disease was diagnosed by indexing tests on Mexican lime and Egyptian sour lime seedlings which produced typical tristeza vein-clearing and wood-pitting after graft inoculation with infected budwood, and by anatomical examination of the sour orange trees at the bud union, which displayed extensive sieve tube necrosis in the functioning phloem (Figure 3), a characteristic of tristeza (11).

In the course of a survey, 8,000 Shamouti trees in an orchard on the coastal plain were checked for external tristeza symptoms and indexing tests were then made for determining the presence of the virus. Among those, 82 trees ranging in age from 20 to 60 years were found to be tristeza-infected, 45 being grafted on sour orange and 37 on sweet lime inarched with sour orange.

The tristeza disease is known to be primarily disseminated from tree to tree by a specific vector, *Aphis citricidus*, which has hitherto not been found in Mediterranean countries. The

Figure 3. Cross sections of the bark of sour orange rootstock. A. Bark of a healthy stock, showing the normal functioning phloem zone (f). B. Bark of a tristeza-infected stock. Note the necrotic sieve tubes within the functioning phloem as black mass in which hypertrophied parenchyma cells (*x*) are located. Abnormal hyperplastic lignified ray (*r*) can also be seen. *x* 125.

only demonstrated vector which is present in the Mediterranean region, *A. gossypii* proved to be a very inefficient vector in California (2), Florida (4), and Texas (1). In Israel, until now, negative results were obtained in all insect transmission experiments carried out in 1955 (9) and also in such experiments made by the writers in the summer of 1958 in co-operation with the Division of Entomology of the Faculty of Agriculture.

From the observations indicated above, it seems obvious that the initial infection of tristeza in the orchard under discussion would originate from introduced diseased budwood, which through grafting would spread the disease to sour orange rootstock. The infected sour orange trees were probably later cut down because of decline and regrafted to Shamouti sweet orange, which would contract the disease through the rootstock. These infected Shamouti trees presumably served as a budwood source for the propagation of Shamouti trees now found to be tristeza-affected. The assumption that the tristeza infection was spread by budwood is supported by the fact that the tristeza-affected trees were found in some cases to be growing successively in the rows, indicating that the buds had been taken from the same budwood stick.

To avoid further spread of tristeza disease, it would be advisable to carry out in all Mediterranean countries a thorough examination of all citrus orchards, to determine whether the disease is present, as previously suggested (7).

Literature cited

1. Dean, H.A. and E.O. Olson. 1956. Preliminary studies to determine possibility of insect transmission of tristeza virus in Texas. *Jour. Rio Grande Valley Hort. Soc.* 10 : 27-30.
2. Dickson, R.C., R.A. Flock and M. McD. Johnson. 1951. Insect transmission of citrus quick-decline virus. *Jour. Econ. Ent.* 44 : 122-126.
3. Frézal, P. 1957. Sur la présence en Algérie de la tristeza et de la xyloporose des citrus. *C.R. Acad. Agr. Fr.* 43 : 190-193.
4. Norman, P.A. and T.J. Grant. 1954. Preliminary studies of aphid transmission of tristeza virus in Florida. *Proc. Fla. State Hort. Soc.* 66 : 89-92.
5. Nour-Eldin, F. and F. Bishay. 1958. Presence of tristeza virus disease in Egypt. *FAO Plant Prot. Bull.* 6 : 153-154.
6. Reichert, I. 1959. A survey of citrus virus diseases in the Mediterranean area. *Citrus virus diseases*, pp. 23-26. Univ. of Calif. Div. Agr. Sci.
7. Reichert, I. 1959. General report on a study mission to investigate virus diseases of citrus. EPPO Int. Conf. on Virus Diseases of Citrus, Sicily, 24 p.
8. Reichert, I. and A. Bental. 1957. Additional tristeza infected citrus varieties found in Israel. *FAO Plant Prot. Bull.* 5 : 129-130.
9. Reichert, I., A. Bental and I. Yoffe. 1956. Transmission experiments on the tristeza and xyloporosis diseases of citrus. *Ktavim* 6 : 69-75.
10. Russo, F. 1956. La presenza del virus della tristeza su limone "Dwarf Meyer" e mandarino "Satsuma" riscontrata in Sicilia. *Riv. Agrumicol.* 1 : 281-289.
11. Schneider, H. 1954. Anatomy of bark of bud union, trunk, and roots of quick-decline-affected sweet orange trees on sour orange rootstock. *Hilgardia* 22 : 567-581.
12. Wallace, J.M., I. Reichert, A. Bental and E. Winocour. 1956. The tristeza virus in Israel. *Phytopathology* 46 : 347.

OUTBREAKS AND NEW RECORDS

UNITED KINGDOM

Elizabeth G. Gray, North of Scotland College of Agriculture, Aberdeen, and *Mary Noble*, Department of Agriculture for Scotland, Edinburgh

Cephalosporium stripe in cereals in Scotland

Cephalosporium stripe was first observed in Scotland in 1952 affecting occasional plants of wheat and barley in plots at Scientific Services, Department of Agriculture, East Craigs, Edinburgh. The causal organism was isolated and at first identified as *Verticillium* sp. The symptoms on barley were very similar to those of leaf stripe caused by *Helminthosporium gramineum* but could be distinguished because of the dark discoloration of the vascular bundles, especially at the nodes. Wheat has been infected artificially by growing sterilized seed on pieces of inoculated agar.

The disease was first observed on a field scale in Kincardineshire and Aberdeenshire in 1955 in wheat (variety Cappelle Desprez). Since then it has been recorded frequently in wheat, oats and barley, affecting scattered plants or clumps of plants. Generally the disease is not noticeable until the plants are in full growth but in April 1959 it was found on a field scale in East Lothian in seedling barley. In wheat, especially in the variety Cappelle Desprez, the symptoms are very striking. The affected plants are about half normal size, with vivid yellow and light green stripes running the entire length of the leaves and with corresponding areas of blackened tissue within the nodes. At maturity, the ears are not well filled. Many of the affected plants are later infected with *Fusarium roseum* and die.

In barley and oats the striping and dwarfing are less marked. The nodes of infected plants are constricted and there are black areas in the vascular tissue. There is no evidence at present that the incidence of the disease is related to the stage in the rotation at which the cereal crop is grown. The fungus has not been isolated from seed of affected plants. However, Orton,[1] in his bibliography of 1931, referred to *Cephalosporium* sp. isolated from wheat in Minnesota in 1924, and seed-borne infection was reported by Nisikado, Matsumoto and Yamauti[2] and by Bruehl.[3] For the identification of the Scottish organism as *Cephalosporium gramineum* Nisikado & Itaka, the writers are indebted to Dr. Bruehl of Washington, who compared isolates with those described in his paper.

The first record of *Cephalosporium gramineum* in Europe was made by Ciferri,[4] who records infection of meadow foxtail (*Alopecurus pratensis*) in Italy. The fungus has not been isolated from grasses in Scotland, although striping of the leaves of couch grass (*Agropyron repens*) in cereal crops has been noted.

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[1] Orton, C. R. 1931. Seed-borne parasites. *W. Va. Agr. Exp. Sta. Bull.* 245.

[2] Nisikado, Y., H. Matsumoto and K. Yamauti. 1934. Studies on a new *Cephalosporium*, which causes the stripe disease of wheat. *Ber. Ohara Inst. landwirtsch. Forsch.*, Kurashiki, Japan. 6 : 275-306.

[3] Bruehl, G. W. 1957. Cephalosporium stripe disease of wheat. *Phytopath.* 47 : 641-649.

[4] Ciferri, R. 1959. Italy - Cephalosporium stripe disease on meadow foxtail. *FAO Plant Prot. Bull.* 7 : 54-55.

UNITED STATES

Plant Pest Control Division, Agricultural Research Service,
United States Department of Agriculture

Occurrence of pumpkin caterpillar

The pumpkin caterpillar (*Diaphania indica*) was determined in November 1959 to be present in the United States from collections that had been made in light traps at three different locations in Florida. Further investigation of undetermined specimens of the genus in the United States National Museum collection which had been received from South America and the West Indies, show that this insect has been in the Western Hemisphere for several years, although apparently not heretofore reported. No unusual amount of damage of the type reported as being caused by this pest in other areas has been observed in Florida. This insect has been reported as being present in Africa, Asia, Australia and islands of the Indian and Pacific Oceans. Cultivated cucurbits are preferred hosts but feeding has also been reported on such crops as beets, cotton, soybeans and eggplants.

New state records of insect pests

New state records of economically important pests received since July 1959 include face fly (*Musca autumnalis*) in Delaware, Illinois, Massachusetts, Michigan, New Hampshire, New Jersey, Pennsylvania, Vermont, West Virginia and Wisconsin; a rice delphacid (*Sogata orizicola*), the known vector of hoja blanca disease of rice, in Louisiana; western corn rootworm (*Diabrotica virgifera*) in Montana; European pine shoot moth (*Rhyacionia buoliana*) in Washington; soybean cyst nematode (*Heterodera glycines*) in Illinois; mimosa webworm (*Homadaula albizziae*) in Louisiana; a thrips (*Gynaikothrips* sp.) in California (new record for the genus in the state); and alfalfa weevil (*Hypera postica*) in Kentucky.

PLANT QUARANTINE ANNOUNCEMENTS

BRAZIL

Ministerial Order of 4 November 1959, published in the *Diario Oficial* of 9 November 1959, revokes Article 6 of the Resolution of 19 November 1934 concerning plant products whose importation requires a phytosanitary certificate. The Order provides that the following plant products imported for any purpose must be accompanied by a phytosanitary certificate :

garlic bulbs	hazelnuts
onion bulbs	birdseed (*Phalaris* sp.,
cumin	*Panicum* sp.)
black pepper	oats
anise	rye
cloves	barley
almonds	flaxseed
walnuts	

Phytosanitary certificates are also required for wheat intended for use as seed, but not for wheat for consumption or industrial use. Importers of wheat not intended for planting must sign a declaration at the Plant Protection Service of the port of entry to the effect that the wheat will not be used for planting. The phytosanitary certificate must be issued by the competent authority of the Plant Protection Service of the exporting country and legalized through a visa by the Brazilian consul of the port of departure.

ISRAEL

By virtue of the Plant Protection Law, 5716, 1956, the Minister of Agriculture of Israel has issued the Plant Protection Regulations (Import of Plants) No. 5719, 1959, which entered into force on 4 September 1959 and revoked the Plant Protection (No. 2) Order, 1934.

Imports prohibited

Importation of the plant and other materials mentioned below is prohibited, except when certified as being required for research or agricultural development by the Minister of Agriculture or a person empowered by him and under a permit from the Director of the Plant Protection Department.

1. Plants of the family Rutaceae, including citrus.
2. Plants of the family Musaceae, including bananas.
3. Mango (*Mangifera*) plants.
4. Avocado (*Persea*) plants.
5. Stone fruit (*Prunus*) plants, except fresh fruit and seeds.
6. Grapevine (*Vitis vinifera*) plants, except one-year-old unrooted cuttings, fresh fruit and seeds.
7. Plants of the family Palmaceae, except seeds but including seed nuts of coconut.
8. Rose (*Rosa*) plants originating from Italy, Australia and New Zealand, and rooted material of whatever origin.
9. Plants of the family Berberidaceae, including *Berberis*.
10. Plants of the family Malvaceae, including cotton but excluding ginned cotton and cotton seeds for industrial uses.
11. Sugar cane (*Saccharum*) plants.
12. Groundnut (*Arachis hypogaea*) plants, except kernels for industrial uses.
13. Tomato plants, except seeds.
14. Fresh tropical and subtropical fruit.
15. Soil and sand, except earths for industrial uses, organic manure, compost, ship's ballast and refuse from aircraft, ships or other means of transport.
16. Live invertebrate animals, including insects but excluding bees and silkworms.
17. Cultures of fungi, bacteria and other organisms constituting pests and diseases.

Imports requiring certification

The following plant materials may be imported only if accompanied by a phytosanitary certificate, and are subject to inspection upon arrival.

1. Seeds of ornamental plants.
2. Vegetables seeds.
3. Spawn of edible mushrooms, known as brick spawn.
4. Fresh fruit and vegetables.
5. Cut flowers.

Imports requiring prior approval

Importation of the following plant materials must be approved in advance by the Director of the Plant Protection Department in writing and indicating the approved country of origin, quantity, and the port of entry. The consignment must be accompanied by a phytosanitary certificate from the country of origin, containing additional declarations endorsing the respective special requirements. They are subject to inspection upon arrival.

1. Seed potatoes

   (*a*) The place of cultivation was inspected at least twice during the growing season and found free from potato wart (*Synchytrium endobioticum*), ring rot (*Corynebacterium sepedonicum*), and Colorado beetle (*Leptinotarsa decemlineata*); free from potato root eelworm (*Heterodera rostochiensis*) as ascertained by laboratory examination of soil samples; and free from virus diseases to an extent ensuring certification as not less than commercial seed "A."

   (*b*) Potato wart was never observed at the place of cultivation.

   (*c*) Potato wart and ring rot were not found within 2 kilometers from the place of cultivation by inspections during the growing season.

   (*d*) Colorado beetle was not found by inspections within 10 kilometers from the place of cultivation during the ten months preceding the issue of health certificate.

Consignments of seed potatoes may be imported if infected only by either powdery scab (*Spongospora subterranea*) or common scab (*Actinomyces scabies*), provided that the proportion of infected tubers does not exceed 10 percent and that no more than 10 percent of the surface of each tuber is affected.

2. Table potatoes

   (*a*) Subject to same requirement concerning potato wart and Colorado beetle as seed potatoes.

   (*b*) The consignment was sorted and packed at a special packing center or at the harbor.

3. Sweet potato propagating material, except seeds

   Place of cultivation was inspected in the growing season and found free from sweet potato weevils (*Cylas* spp., *Euscepes* spp.), and virus diseases, and from potato root eelworm, on the basis of examination of soil samples.

4. Flower bulbs

   Place of cultivation was inspected in the growing season and found substantially free from diseases and pests, including virus diseases, and free from potato root eelworm, as ascertained by examination of soil samples.

5. Rose cuttings and budwood, other than those originating from Italy, Australia and New Zealand

   (*a*) The place of cultivation and fields within 5 kilometers were inspected during two years preceding the issue of health certificate and found free from San José scale (*Quadraspidiotus perniciosus*).

   (*b*) Place of cultivation was inspected in the growing season and found free from crown gall (*Agrobacterium tumefaciens*) and virus diseases.

6. Carnation propagating material, except seeds

   (*a*) Place of cultivation was inspected during the growing season and found free from bacterial wilt (*Pseudomonas caryophylli*, *Erwinia* spp.) and tortrix moth *Tortrix pronubana*), and free from potato root eelworm, on the basis of examination of soil samples.

(*b*) The consignment is free from rust (*Uromyces dianthi*).

7. Grapevine one-year-old unrooted cuttings

(*a*) The country of origin is free from Pierce's disease (lucerne dwarf virus).

(*b*) The place of cultivation and fields within 5 kilometers were inspected during two years preceding the issue of health certificate and found free from San José scale.

(*c*) The place of cultivation was found in the growing season free from grape phylloxera (*Viteus vitifolii*) and *court noué* virus.

8. Strawberry propagating material, except seeds

The place of cultivation was found in the growing season free from red core (*Phytophthora fragariae*), strawberry mite (*Tarsonemus pallidus*), chrysanthemum eelworm (*Aphelenchoides ritzema-bosi*), strawberry eelworm (*Aphelenchoides fragariae*) and virus disease, and also found free from potato root eelworm, by examination of soil samples. Red core should have never been observed at the place of cultivation.

9. Wheat (*Triticum*) seed

Seeds were found by laboratory test immediately before dispatch free from flag smut (*Urocystis tritici*) and ryegrass seed.

10. Barley (*Hordeum*) seed

The place of cultivation was found in the growing season free from barley stripe mosaic.

11. Ryegrass (*Lolium perenne*) seed

The seeds were found by laboratory test immediately before dispatch free from blind seed disease (*Ciboria temulenta*).

12. Vegetable seeds

The place of cultivation was inspected during the growing season and found free from specific diseases: pea (*Pisum*) seed from bacterial blight (*Pseudomonas pisi*); bean (*Phaseolus*) seed from bacterial wilt (*Corynebacterium flaccumfaciens*), common bean blight (*Xanthomonas phaseoli*) and anthracnose (*Colletotrichum lindemuthianum*); tomato seed from bacterial canker (*Corynebacterium michiganense*) and bacterial spot (*Xanthomonas vesicatoria*); pepper (*Capsicum*) seed from bacterial spot; lettuce seed from lettuce mosaic.

13. Flax seed

The seeds were found by laboratory test immediately before dispatch free from pasmo disease (*Mycosphaerella linorum*).

14. Stone fruit (*Prunus*) seed and pecan (*Hicoria pecan*) seed

Trees producing the seeds were found by field inspections free from virus diseases.

15. Fresh pome and stone fruit

The consignment was found by inspections immediately before dispatch free from San José scale oriental fruit moth (*Grapholita molesta*) and fruit flies of the family Trypetidae.

Imports subject to inspection

Importation of the following plant materials is subject only to inspection:

1. Fresh fruit and vegetables, other than those whose importation is prohibited or otherwise restricted, when imported as personal baggage or in parcels up to 10 kilograms.
2. Cut flowers, other than those prohibited, when imported in personal baggage.
3. All kinds of grains and dry seeds, intended for consumption or industrial uses, except cotton seed.
4. Meal, flour, bran and oil cake.
5. Dried fruit and vegetables.
6. Dry fruit, including shelled and crushed nuts.
7. Coffee and cocoa beans.
8. Spices.

9. Dried medicinal plants.
10. Dried mushrooms.
11. Copra.
12. Ginned cotton.
13. Timber without bark.
14. Bamboo canes and rattan for industrial uses.
15. Straw for industrial uses, including broomcorn.
16. Straw and shredded straw as packing material.
17. Herbarium specimens.
18. Sea grass.
19. Peat.
20. Consignments of used bags.

Imports requiring permit

The following articles may be imported only under a permit from the Director of the Plant Protection Department and in accordance with the conditions stated therein. The consignments are subject to inspection on arrival.

1. All plant materials for cultivation or propagation whose importation is not prohibited or otherwise restricted.
2. Prohibited articles, whose importation is authorized for research or agricultural development.
3. Cotton seed for industrial use.
4. Timber with bark.
5. Hay, green fodder, straw for fodder or litter of livestock.

General provisions

FREEDOM FROM SOIL

Every consignment of imported plants must be reasonably free from soil and sand.

PACKING MATERIAL

Plants for importation must be packed in unused containers and the following packing materials are admissible: mosses, including sphagnum, sawdust, shavings and woodwool, raw cellulose, ground cork, vermiculate, charcoal, vegetable fiber free from pulp, peat, paper and cardboard, all of them free from pests and diseases and clean from other material.

MARKING OF PACKAGES

Packages of nursery stock and seeds, including seed potatoes, should be marked with the grower's identification mark. Packages of table potatoes, flower bulbs, including tubers, and fresh fruit, should be marked with the name and address of the person who carried out the sorting and packing. Packages of seed potatoes and table potatoes should bear the seal of the Plant Protection Service of the country of origin.

HEALTH CERTIFICATE

Health certificates should be in the form as annexed to the International Plant Protection Convention, 1951, and signed by a person authorized by the Plant Protection Service of the country of origin. It should be attached to the bill of lading or to other documents relating to the consignment. Quantities and names of the plants in the consignment may be indicated in a signed copy of the invoice attached to the certificate. The country in which the plants were grown should be indicated in the certificate as the country of origin. If the plants were grown in more than one country, the country in which they were last grown should be indicated, and if they were grown in that country for less than one season, the other countries should also be indicated. The inspection indicated in the certificate should be carried out within 14 days before dispatch of the consignment.

UNITED KINGDOM (Scotland)

The Importation of Plants (Scotland) Amendment Order, 1959, which came into operation on 18 September 1959, amends the Importation of Plants (Scotland) Order, 1955 (see *FAO Plant Prot. Bull.* 3 : 143, 1955) so far as it relates to the importation of potatoes into Scotland. The provisions of the new Order are essentially the same as those of the Importation of Potatoes Order, 1959, for England and Wales (see *FAO Plant Prot Bull.* 7 : 81-82, 1959).

NEWS AND NOTES

COMMONWEALTH ENTOMOLOGICAL AND MYCOLOGICAL CONFERENCES

The Seventh Commonwealth Entomological Conference and the Sixth Commonwealth Mycological Conference will be held in London, from 6 to 15 July and from 15 to 22 July 1960, respectively. A joint session will take place on the final day of the Entomological Conference to discuss plant viruses and their vectors and the link between research in plant protection and extension services.

The Conferences at the opening meetings will be devoted to the discussion of many topics of general interest, which will be introduced by one or more speakers. Detailed programs will be circulated at a later date.

The Commonwealth Institute of Entomology and the Commonwealth Mycological Institute are responsible for making arrangements for the Conferences and further details may be obtained from the Directors of the two Institutes.

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

The Eighth Technical Meeting of the International Union for Conservation of Nature and Natural Resources (IUCN) will take place at Cracow, Poland, 15-24 June 1960, following immediately the Seventh General Assembly of the IUCN in Warsaw. One of the major topics of discussion at the Technical Meeting will be the ecological effects of biological and chemical control of undesirable plants and animals. Excursions will be arranged during and after the meetings. Preliminary circulars and further information can be obtained from the Secretariat of IUCN, 31, rue Vautier, Brussels 4, Belgium.

NATURAL RUBBER RESEARCH CONFERENCE

An International Conference on Natural Rubber Research, sponsored by the Rubber Research Institute of Malaya with the support of the Government of the Federation of Malaya and the Rubber Producers' Council, will take place in Kuala Lumpur from 26 September to 1 October 1960. The Conference will be held in two sections running concurrently, one for research on natural rubber production and the other for research on the preparation and use of natural rubber and latex. The section on production will cover pests and diseases of rubber trees and weed control, as well as nutrition, ecology, breeding and selection, vegetable propagation, tapping and yield stimulation, and ground covers.

Inquiries about the Conference should be addressed to: Rubber Research Institute of Malaya (Rubber Conference), P. O. Box 150, Kuala Lumpur, Malaya.

PLANT EXPLORATION, COLLECTION AND INTRODUCTION

FAO Agricultural Studies No. 41

The requirements of an ever-increasing world population have created a pressing need for the introduction of new plant material which might offer possibilities of crop and grassland improvement. In view of this need, some countries have already taken steps to deal with this problem, while others have voiced an interest in trying to resolve it on a national or international basis.

This study, in reviewing briefly the botanical history of some representative economic plants, presents various timely views on a co-ordinated scientific approach to the exploration, collection and introduction of new plant material, and presents suggestions as to how international organizations might help provide that co-ordination and technical guidance.

The study also indicates a need to consider how plant collections should be made and how extensive they should be in order to obtain a representative sample of the species or population being collected. Better scientific planning and conduct of exploration is advocated in place of the system of random collections of hundreds of thousands of samples.

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